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DETERMINATION OF POLLEN VIABILITY AND GERMINATION RATIOS IN MERSIN ECOLOGY OF SOME EARLY APRICOT

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Abstract
Turkey is the leading country in the production of world apricots (Prunus armeniaca). In the country, apricots are usually grown for drying and fresh consumption, and apricots are also used for different purposes. This study was carried out to determine pollen viability and germination status in some foreign apricot varieties grown in Mut district of Mersin province, which has an important place in early ripening apricot production in Turkey. Pollen viability and germination ratios were determined by TTC and 1% agar 10% method in Mogador, Mikado, Pricia, Flopria apricot varieties. In terms of pollen values, the best result in terms of viable pollen is from the Mikado with 77.02% and Mogador varieties with 78.61%, while the Pricia variety with 44.09% in semi-viable pollen provides the most result, while Flopria and Pricia varieties produce the highest values in dead pollen results. In the germination tests, pollen germination rates were medium level in Flopria, Mogador and Mikado varieties the pollen germination rate of the Pricia variety is only 8.96%. The results obtained will be a guide in new orchard establishment and breeding studies.

Keywords: Apricot, breeding, pollen germination, pollen viability, TTC

1. INTRODUCTION

Turkey ranks first among the leading countries in the world in apricot production. This production value is 846.606 tons according to 2019 year's statistics (FAO, 2019). Apricots are usually produced as drying and fresh consume in Turkey (Ercisli, 2009). While the province of Malatya is leading in drying production, Mersin has a say in fresh consume production thanks to the early varieties brought to the country with low cooling requirements.

Late spring frosts are among the factors affecting the production of apricot (Kaya et al., 2018). Like other stone fruit types, apricots can be affected by frost from time to time since it blooms early in the spring. In addition, problems arising from pollination and fertilization are among the factors that affect fruit yield in apricot. Apricot has a hermaphrodite flower structure (Asma, 2011), and as with most fruits, the parts of the flower must develop fully and healthy in order to obtain economic products (Abacı and Asma, 2014). However, due to the incompatibility seen in apricot, there are great problems at the point of pollination and fertilization.

In order to make apricot cultivation, the fertilization biology and s allele structures of the variety or cultivars to be used in the new orchard to be established should be well known. In addition, it is important to determine the pollen viability and germination rates that affect the pollination and fertilization success. Pollen viability and germination are affected by many factors such as ecology,

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annual maintenance work, especially genetic structure (Brittain et al., 2014; Klein et al., 2015; Yaman and Uzun, 2020).
This study was carried out in order to determine pollen viability and germination status in some foreign apricot varieties grown in Mut district of Mersin province, which has an important place in early ripening apricot production in Turkey.

2. MATERIALS AND METHODS

Material

The pollens of the apricot varieties used in the study were obtained from Mogador, Mikado, Pricia and Flopria varieties grown in Mut, Mersin province in 2021 year. The varieties used in the study are 3-4 years old and the flowers that have reached the stage of balloon for pollen extraction were taken from different sides of the tree and branches of different heights. The anthers were separated from the flowers with a forceps. It was kept overnight at room temperature for pollen bursting.

Method

Pollen Viability Test

2,3,5, Tripyhenyl Tetrazolium Chlorid (TTC) was used to determine the pollen viability of different cultivars. Norton's method (1966) was used in the preparation of the TTC solution.
Flower powders of the varieties were sprinkled on the TTC solution dropped on the slide with a watercolor brush and a lamella was placed on it. 3 sets were prepared for each variety and counts were made under a light microscope in 3 different regions in each set. During the count, red colored pollens were considered as viable, pink colored ones as semi-viable and colorless (not dyed) as dead (Abacı and Asma 2014).

Pollen Germination Test

The medium containing 1% agar + 10% sucrose was used to determine the pollen germination rates. Counts were made in 3 petri dishes for each variety and in 3 different regions for each petri dish. Before counting, the pollens were sprinkled with a watercolor brush and kept at 23-25 C degrees for 24 hours. Similar to the pollen viability test, observations were made under a light microscope.

Data Analysis

Experimental data were subjected to statistical analyses with the aid of software SPSS 15.0 (IBM Company, USA) and significant means were compared with Duncan's multiple range test at P <.05 significance level and the values of the varieties are presented as mean ± standard deviation (SD).

3. RESULTS AND DISCUSSIONS

Pollen viability of genotypes used in the study significant differences in levels were observed (Table 1). Obtained from TTC test on pollen belonging to genotypes % of differences between living and nonliving rates 95 confidence was determined to be statistically significant (P <0.5). The highest viability rate was observed in the Mikado with 77.02% and Mogador varieties with 78.61%, and the lowest value was observed in Pricia apricot genotype with 44.09%.
Pollen viability levels, environment varieties in terms of conditions and fertilization biology compatibility between fruit trees the most important affecting fruit holding capacity are factors Kelen and Demitaş, 2003; Dantas et al., 2005). Mısırlı et al. (2004) by TTC test on five apricot varieties according to the 2001 data of the research in the pollen viability analysis, the pollen viability rate is 75.93% (Hasanbey) and they determined that it ranged between 52.66 (Hacıhaliloğlu). Asma (2008) found pollen viability values between 77.5% (Canino) and 41.5%

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(Roxana) in his study on eight apricot genotypes. Bircan and Kargı (2013) found that pollen viability values varied between 89.06% (Aurora) and 52.39% (Pisana) in their study with thirteen apricot varieties, and pollen viability levels varied according to the variety and years and feeding. They reported that the location of the tree and the flower in the tree may change depending on the branch load and many other factors.

Table 1. Percentages of viable, semi-viable and dead pollen in apricot varieties used in the study

Varieties	Viable (%)	Semi-viable (%)	Dead (%)
Flopria	52.96±13.60b	29.16±10.16ab	17.86±8.55a
Mogador	78.61±2.68a	19.25±1.31b	2.12±1.37b
Pricia	34.64±6.09c	44.09±8.83a	21.27±8.05a
Mikado	77.02±10.36a	17.01±8.73b	5.96±2.45b
Mean	**60.81±20.56**	**27.38±13.09**	**11.80±9.78**

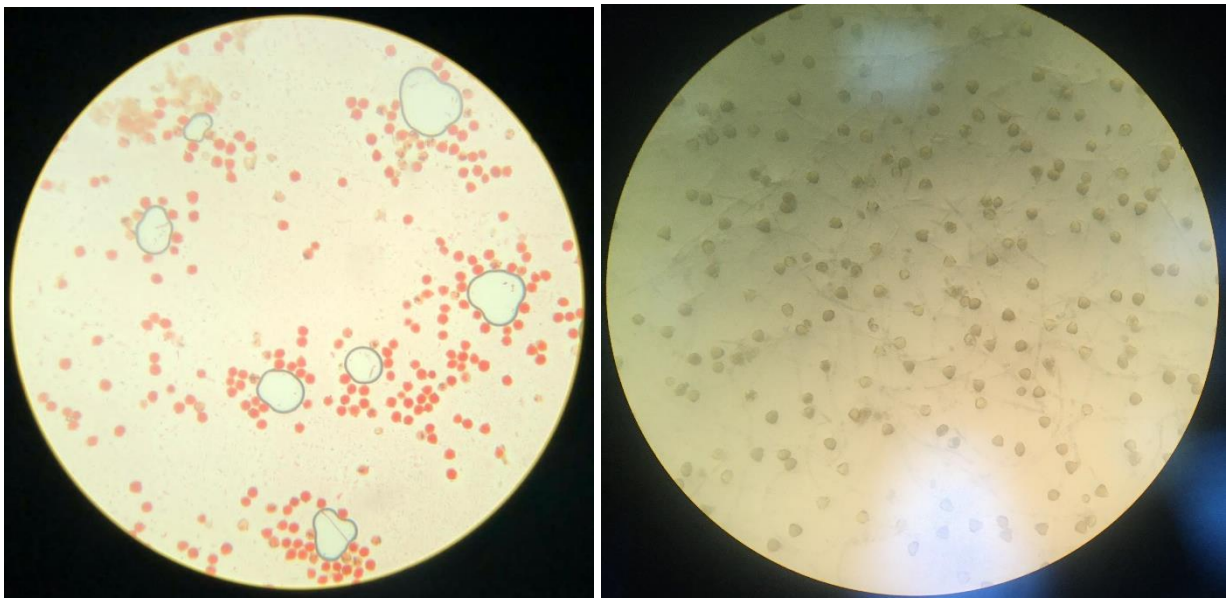

Figure 1. Pollen viability and germination in the mikado apricot variety

Table 2. Percentages of pollen germinated and non-germinated in the apricot varieties used in the study.

Varieties	Germinated (%)	Non-germinated (%)
Flopria	59.63±4.93a	40.36±4.93b
Mogador	46.93±11.85a	53.06±11.85b
Pricia	8.96±6.47b	91.03±6.47a
Mikado	41.23±15.73a	58.76±15.73b
Mean	**39.19±21.52**	**60.80±21.52**

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Pollen germination power of apricot varieties is required to be at least 25%. Conditions that arise depending on the genetic structure, nutrition and environmental conditions affect the germination power (Asma, 2011). In this study, the highest germination rate was obtained in Flopria variety with 59.63%, while the lowest germination rate was obtained in Pricia variety with 8.96% (Table 2).
Paydaş et al. (2001), in their study on sixty-two natural apricot genotypes, stated that the pollens of these genotypes worked on agar-petri media containing 0.6% agar + 15 sucrose. They found that the germination strength varied between 79.19% (31K03) and 34.66% (Ablugoz). Bircan and Kargı (2013) found that pollen germination rates in 1% agar + 15 sucrose environment varied between 49.99% (Ninfa) and 3.63% (Bulida) in their study with thirteen apricot varieties, and the germination ability of pollen was determined according to germination environments, varieties and years. They state that as it changes, it can change depending on the climatic conditions, the nutrition of the tree and many other factors.

4. CONCLUSIONS

As a result, low pollen germination rate and short pollen tube are factors affecting fruit setting rate and tree productivity. This is undesirable by both the breeder and the producer. For this reason, it is necessary to know the viability of the plant pollens that will be produced or used as sire in breeding programs.

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